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Knowledge Management Support For Enterprise Resource Planning Implementation

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Abstract

This study addresses the issues of Enterprise Resource Planning (ERP), Knowledge Management (KM) and SECI model (socialization, externalization, combination, internalization). Various research have highlighted the importance of knowledge of ERP users for successful ERP implementation, however a major obstacle from the perspective of integration or knowledge transfer cycle still exists. The main problem in ERP implementation is the difficult integration of tacit (embedded) and explicit knowledge cause most of this knowledge are embedded in ERP external parties (such as consultants, vendors, suppliers, supervisors, experts, and other working partners). The focus of this study is to propose process for transfer knowledge from external organizations into organizations based on the model of SECI. To note that this paper is not to modify the basic model of SECI, but SECI model to making as a function of mediator between the external and internal ERP system implementation in company. The authors used a systematic literature review approach, starts with literature review, problems identification, selection process, assess, synthesize and write down the ideas proposed, and then make conclusions. Finally, the output of this research is a new model (schematic and technical) of the process and transfer knowledge order to maintain and re-use assets from external knowledge obtained during the pre to post ERP implementation to be used jointly by the company.

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Keywords: Enterprise Resource Planning (ERP), Knowledge Management (KM), Knowledge Transfer, Knowledge Worker, SECI Model.

1. Introduction

Enterprise resource planning has been implemented by many organizations seeking for a system to integrate various business process across various functions. Much have been discussed about the challenge in implementing ERP systems. One of the issues is that ERP system implementation cycles will occur implementation transition team that resulted is loss of assets knowledge, experience, and tutor of knowledge transfer.

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Another issue is the amount of fund needed to pay trainers, consultants and other external parties. Then, there is also the gap of knowledge and understanding of ERP system itself. Furthermore, users' knowledge, experience and problems is not well documented. Most users fail to document when they encounter problems and eventually find the solutions whereas it can potentially be very useful for other users. Users sent to attend workshop do not submitted a written report on the knowledge acquired during training. Finally, and perhaps the cause of the above issues, is the fact that there have not been a structured and formal processes and mechanisms for knowledge asset management in a company implementing ERP systems.

Successful of ERP implementation is closely related to a specified group of knowledgeable employees as well as effective management of teams' knowledge during development cycle of ERP systems [1]. The main role of knowledge management in ERP implementation process is to facilitate knowledge sharing among team members of ERP system.

However, [2] revealed another problem faced by the ERP team, which is difficulty of integrating an organization's internal knowledge with external knowledge. Another crucial problem of ERP system implementation according to [1] is that employees who use modules must have a good understanding of the business process and thus they must increase their knowledge of ERP systems. This is not an easy task as the ERP system have an internal focus, however there is a great need to integrate with knowledge assets of external parties such as suppliers, consultants, and contractors.

The above issues imply that there seems to be fragmentation in the process of connecting external organizations (consultants and other external parties), which makes integration of knowledge increasingly difficult. Therefore, the needs and solutions required for knowledge integration process can be seen as a theoretical gap in existing literature on ERP implementation, especially during ERP implementation cycle.

In an effort to answer limitations related research in process of knowledge integration, the authors propose a scheme and the cycle of knowledge transfer between external to internal company and collaborate theory developed by [3] SECI model (socialization, externalization, combination, internalization). This idea is also in line with suggestions from previous studied stating that findings from current studies need to be expanded by combining respondents from consultants, users and level of executives involved in ERP system project [4].

2. Literature Review

ERP implementation is a complex process, lengthy, and expensive, usually in millions dollars [2]. Most importantly, in many cases it also requires existing business processes to be re-engineered (business process reengineering) to be adjusted with ERP modules or vice versa. Investments are for software and services such as consulting, implementation, training, and systems integration.

Companies are forced to look at a gap in every ERP implementation process as an effort to minimize failure and maximize capital expenditures. This implies the need to acquire knowledge and experience of external parties (consultants, vendors, suppliers, experts) during the process of ERP implementation. Therefore, companies must begin to change the paradigm in the direction of generating knowledge worker alias knowledgeable workers. For example, employees who work on customer billing need to know more about IT systems of production and accounting. Similarly, the IT experts need to adapt to new system with needs and enterprise systems to operate optimally.

As stated by [5], the implications of ERP systems is that the knowledge sharing process should really be able to penetrate the boundary across divisions and different mind sets about how to do the whole process. In addition, the slow acceptance response of ERP systems can also be caused by the fact that users rely on the relevant prior knowledge (what they know from old system) to try for understand the

new knowledge system (ERP). In other words, the user may not be resistant to change, but they try to understand the changes.

Companies must integrate functional knowledge [6], which is quite a difficult task due to the nature of knowledge that is dispersed, differentiated, and embedded. Other studies have examined the impact of knowledge integration and its implications, as well as process of knowledge integration. The studies warned about the difficult and importance of knowledge integration from all parties involved in ERP implementation, but they failed to explore in detail the process of knowledge integration and resolve the existing barriers.

Implementation ERP system is inseparable from the role of consultants and other external parties. Consultants was paid with enormous costs. If the company uses the services of consultants on an ongoing basis without trying acquire the knowledge and experience that they have, this may increase the budget expenditures of the company, not to mention the cost of regular training by the consultant. If the company use a long-term mind set, then they will see the knowledge transfer or acquisitions from the consultant as a significant advantage for the company, not only from a financial aspect but also from the knowledge capacity and ability of the users of the ERP system later.

Related research by some authors have been interested the factors affect the selection of knowledge transfer mechanisms. Chai, et al. indicate the choice of mechanism depends on nature (tacit or explicit) of knowledge being transferred, and of dependence of the knowledge to its context [7]. Jasimuddin asserts that selection of transfer mechanism depends on three elements, status of actors implicated in transfer, relational aspects, and social ties and proximity of actors [8]. Many studies on transfer of knowledge are found in literature, but very few on the mechanisms used to transfer the knowledge [8-9].

3. Successful ERP Implementation

Planning of ERP system becomes very important in modern business operations, because ERP strategy has played a major role in transforming the company into a better computing and an enabler of achieving the company's competitive advantage [11] ERP systems can provide competitive advantage through increased business performance, among others: integrating supply chain management, supply, inventory, ordering, management and production planning, delivery, accounting, human resource management, and all activities that occur in modern business [12]. A studied found that over 60% of Fortune 500 companies have adopted ERP system [13]. In another study conducted in [14] said the company robotics increased delivery times reached 40% after implementing ERP systems, and Delta Electronics succeeded in reducing the laboratory requirements of production control division up to 65%.

The successful of implementation ERP systems cannot be separated from ability of implementation team and users of ERP system itself. The ability is closely linked to capacity of knowledge. Because of that we need a way so that the problem of knowledge level implementation team and users can be handled in advance to obtain better results. In line with this [15] stated that ERP systems do not offer a competitive advantage if it acts alone, but the ERP must be combined with social and intellectual capital in the company.

A concept known as knowledge management is used during the project to facilitate the practice of sharing knowledge. In addition, under the ERP system development cycle, there is a part of the knowledge that is difficult to be captured and documented i.e. tacit knowledge, because it cannot be set using the repository of knowledge in the company [16]. KM techniques facilitate access to this kind of knowledge that different from explicit KM system.

4. Knowledge Management (KM)

The fundamental reason why Japanese companies are successful, because of their skills and experience was created of organizational knowledge [3]. Knowledge creation is achieved through acquiring of synergistic relationship between tacit and explicit knowledge.

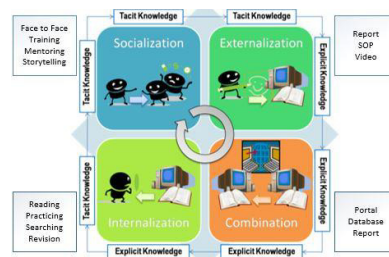


Fig 1. Model SECI (based on [5-3])

Further knowledge transfer between tacit knowledge and explicit knowledge and reversed process, presented in the model conversion with 4 ways (fig 1), namely: socialization process, externalization process, combination process and internalization process. In this model (fig 1), knowledge is continuously converted and created as users practice and learn. The process should be seen as a continuous, dynamic, swirl of knowledge.

KM definition according to [17] in his book *the knowledge management toolkit* is the company's knowledge management in creating value for business and generate a sustainable competitive advantage with optimized the process of creating, communicating and applying all the knowledge needed in order to achieve business goals. Moreover, the purpose of using KM is to improve communication between top management and employees to maintain work processes.

Knowledge sharing challenges were caused by the fact that knowledge has become a routine process, but the employees are not fully aware of the separate steps taken in the process of explicitly expressing knowledge. When one of these employees selected as a team member of ERP implementations, there is a need to share this kind of knowledge among people. [1] stated that retaining knowledge at the time of transition from the owner's knowledge is an important issue, much like when developer or tutor of ERP system leave from company, it appears the problem is lose of knowledge brought by the developer or tutor of ERP system.

The presence of KM concept began to attract attention as a device capable of supporting the company in maximizing the knowledge and information at all levels of management to help improve the performance of the company. According to [18], KM practice is recognized as an important instrument for achieving specific goals so that the organization can sustain economic growth and competitive advantage. An increasing performance is supported by KM practice and find successful implementation requires integration of four pillars, namely leadership, learning, organizational structure, and technology.

ERP system and KM initiatives are complementary, not contradictory [1]. Their findings show a balanced perspective between ERP systems and KM systems can assist companies in utilizing the explicit knowledge and tacit knowledge sharing across and simultaneously. Meanwhile, transfer of experience gained during project from the ERP system and the ERP system transition team members, transfer the expertise of external consultants for ERP systems team members, as well as contextual knowledge transfer to the user to better understand the basic concepts of ERP systems, and to be challenges posed by tacit knowledge of ERP and specific knowledge. The process of knowledge integration often encounters barriers i.e. tacit and knowledge that are embedded in routines and standalone [19]. Tacit knowledge that exists in system and the organization made the implementation knowledge integration to be slow and difficult [3].

External consultants are also an integral part of any ERP implementation project and therefore, knowledge sharing, especially in the form of tacit to tacit among the team members ERP system and external consultants. This is very important because usually a team of consultants leave the company after the completion of ERP systems installation and subsequently handed over to the ERP team to retain and

transfer the knowledge to the company. Another important reason is the new member cannot quickly grasp the ERP system and learn about the knowledge of ERP systems that has been owned by the previous team if they was left with only users manuals and all project documents [1].

5. Methods

In this study, the authors used a systematic literature review approach [20]. The study starts with abstract, introductions, literature review, problems identification, conducting the selection process, assess, synthesize and write down the ideas proposed, and then make conclusions.

5.1 Research Plan

First, a plan review is prepared including the process and proper method for determining research question, research strategies and methods of synthesis. Moreover, it also divides the search by setting up folders relationships among elements of discussion that will be written, such as relationship between knowledge management to support the success of ERP system.

5.2 Research Identification

Identification of systematic research stage begins with identification of key words and search terms. The authors use common keywords to find relevant writings about knowledge management and ERP systems. The search strategy is aimed at finding papers published by journals, conference proceedings and technical reports, both from the general search engine, Elsevier Scencedirect, IEEE explore and other related links. Research sources also include thesis reports and guidance for writing literature review.

Meanwhile, the search terms used were: why KM and ERP are important for success the company's competitiveness, knowledge management for ERP success, external to internal knowledge transfer company, and others knowledge on the external side, SECI knowledge conversion model and related models in cycles sharing knowledge and experiences during ERP process.

5.3 Paper Selection

Paper selection process carried out by way of: (i) preliminary selection by reading abstract and make a list of related paper (ii) learning the methods used (iii) then the final selection is read all the contents of paper that is in the reference list.

An initial list consists of 45 papers that the authors have found to be relevant to the topic and potential candidate papers for inclusion in the article. Authors then perused all the 45 papers and 27 papers decided to be included in the final list for review.

5.4 Synthesis

The last stage, authors only use the papers that have been selected and classified previously in order to scope down and synthesis findings.

6. Research Framework and Technical Process

The main aspect proposed in this paper is: how the company can carry out the process of knowledge transfer or sharing from external parties responsible for ERP implementation and then stored and reused them internally. Knowledge transfer process is not an easy task, especially for tacit knowledge (embedded). Previous related studies have acknowledged the difficulty to integrate knowledge during the ERP process.

Fig 2 show the study tries to offer solutions to identify and create a model of how companies make the process of transfer knowledge from the external ERP implementation to perform together for benefit of the internal company, which in turn can generate knowledge worker or knowledgeable workers (for individuals and organizations) and in this study SECI model becomes the mediator between external and internal for knowledge transfer process.

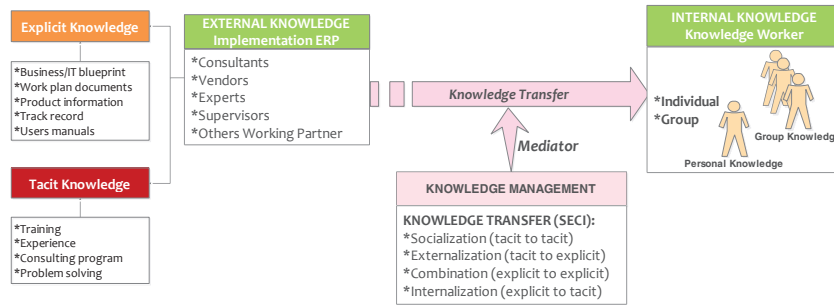


Fig 2. Research Model

6.1 Dimensions and Knowledge Transfer Scheme.

The first step prior to formulating mechanisms of knowledge transfer process from external to internal company, authors categorize the people considered as external parties of ERP implementation and the knowledge assets that they have. Then, grouping assets into tacit and explicit knowledge, and supporting technology [21] which allows for corporate use. The results of the grouping is shown in table.

Table. Knowledge Asset and SECI Process

External Parties of ERP	External Knowledge Asset	SECI Process	IT Support
Consultant	<ul style="list-style-type: none"> • Explicit Knowledge: <ul style="list-style-type: none"> • Business/IT blueprint • Work plan documents • Product information • Track record • Users manuals • Tacit Knowledge: <ul style="list-style-type: none"> • Training • Experience • Problem solving • System configuration 	Combination (explicit to explicit)	Database, information repository, best practices.
Vendors		Socialization (tacit to tacit)	Video conference, electronic groups, e-mail,
Supervisors		Externalization (tacit to explicit)	Chat groups, lessons learned database, portal
Experts		Internalization (explicit to tacit)	Computer-based simulation & communication.
Other Working Partners			

6.2 Technical Process Application of SECI Model.

The process of organizational knowledge creation occurs because of the interaction (conversion) between tacit and explicit knowledge through the knowledge discovery process (discovered knowledge), namely: combination and socialization, as well as knowledge capture process (capture knowledge) namely: externalization and internalization [22].

• Combination (explicit to explicit knowledge process).

The combination process includes conversion of explicit knowledge into explicit knowledge. Staff were directed to study documents such as documents process of ERP systems implementation, track record and vendor consultants, IT or business blueprint, guide use of ERP system modules, then they can produce a new document by way of summarizing and inserting new ideas. In practice, the things that can be done for enterprise ERP implementation in this cycle includes:

- Dissemination of explicit knowledge through presentations or direct meetings or sharing sessions every month [23].
 - Documents of external consultants, other articles, books are certainly related to use ERP systems and vendors are perused by the employee to summarize the reading materials.
- #### • Socialization (tacit to tacit knowledge process).

Socialization process of sharing knowledge and experience that is created by interaction and direct experience (tacit to tacit knowledge), for example: coaching, conversation, mentoring and internships, which transmit knowledge through observation, imitation and practice. The practices, such as:

- Interaction between external parties with the staff of company, project leader with staff and consultant project with team leader. The junior staffs will build their own tacit knowledge based on their own observations [24].
- Conduct ERP system user education. Education referred here is through knowledge and personal experience that will be shared to other employees [23].
- *Internalization (explicit to tacit knowledge process).*

The process of knowledge transfer based on learning and knowledge acquisition made by employees against the explicit knowledge of external parties distributed to the Company. The practices are:

- Creating knowledge documentation. Such as document of problems solution that are often encountered in using ERP system.
- Employees are required to share documents of self and training ERP systems that have been followed and combine with previous experience that adds to tacit knowledge through explicit [25].
- Simulation or experimentation (learning by doing) [26].
- *Externalization (tacit to explicit knowledge process).*

Tacit into explicit knowledge, for example: writing books, articles, magazines, dialogue, learning by experience, training, face to face meetings. The activities such as:

- When consultants or vendors find new cases and solutions of ERP implementation, the company facilitates a meeting or discussion forum, where employee and participants documents the key findings to be used as guidelines [27].
- Translating tacit knowledge from experts. The opinions and findings of previous cases related to the implementation of ERP system ever and successfully.

7. Conclusion

Basically this paper refers to the used SECI model as a mediator (or tool) for mediate the process of knowledge transfer between external companies of ERP implementation (such as consultant, vendors, suppliers, supervisors, experts, and other working partners) to internal company. Then, the authors adds another variable outside the main model of SECI, the asset and its external variable of knowledge (tacit and explicit) that carry and variable of internal knowledge company (individual and group). Weakness and also key success factor of this model depend on seriousness of top management support for sharing program of knowledge and experience at all levels within the company, particularly in the level of employee.

Successful of ERP implementation system is influenced by the level of skills and users knowledge to operate the features of ERP system. In addition, a dynamic knowledge assets are able to provide valuable learning for the growth of the company in the form of the creation of a knowledge worker or knowledgeable employees. For the enterprise ERP system users can use this models as a guide in conducting activities and programs to share knowledge. This paper has offered the mechanism of the process of knowledge transfer from external to internal company during the process of pre-post ERP implementation. This paper also shows the importance of deploying both formal and informal knowledge transfer mechanisms. Further studies include the implementation of the proposed mechanism to assess its effectiveness.

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